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Specification of the Patent granted to RICHARD WILLCOX, *of the City of Bristol, Engineer; for Improvements upon the Fire or Steam Engine and Furnace.*

Dated April 30, 1801.

With a Plate.

TO all to whom these presents shall come, &c. Now KNOW YE, that I the said Richard Willcox do hereby declare, that my said invention is described by the above drawing, and in manner following; that is to say: My valuable improvements aforesaid consist in, first, modes or methods of increasing the product of steam without adding to the consumption of fuel; secondly, an addition to the chimney-flue of a furnace, by which the descent of the smoke and heated matter to a lower level than that of the fire-place is regulated and adjusted at pleasure; and, thirdly, certain new arrangements and constructions of the steam-engine, by which its power and effects are greatly increased. These improvements, as well with regard to the general and scientific princi-

ples upon which the same are established, as also with regard to the requisite variations of structure, which every engineer of competent skill must adapt to the local and other circumstances of the work he undertakes, may easily be deduced from the following description, with the drawings thereunto annexed. (See Plate XVIII.)

Fig. 1 represents a view or section of a steam-engine with its furnace, in which my improvements are adopted. A A, represents the furnace, composed of wrought, plate, or cast iron, or other metals, which may be constructed of various forms, but the figure here delineated is one of the best. In Fig. 1 it is seen sideways, but in Fig. 3 it is seen in front. In this last figure *a a* represents the external metallic part formed conical; *b*, represents an interior part or dome fixed at bottom to the piece *a a* by means of flanches and screws. The interior cavity between the conical piece and the dome is perfectly closed, excepting that it has an aperture for the admission of regulated portions of water, and another aperture through which steam can be suffered to pass. C, is the door or opening of a fire-place. Beneath the dome *c* is the grate, and *f* the ash-hole. The grate occupies about three-fourths of the space, measured by a line from the front of the furnace, and terminates against an upright inclined plate *d*, represented in Fig. 1 by D, which causes the flame or heated vapour to pass more immediately upwards against the dome, and then downwards behind the plate, through an opening which leads into the chimney. The dark line or shaded part G represents a vertical register or sliding plate, which affords the peculiar advantage, that when the fire is first lighted it may be drawn up, and the current of vapours through the chimney will be extremely rapid; but as soon as this current has fairly taken place, the piece G may be slided

slided down to any required position, and by that means cause the vapour to descend as low as the judgment or experience of the operator may dictate.

Fig. 1, E, represents an intermediate cylinder or reservoir of steam, communicating with the upper part of the furnace. From this vessel a communication F is made with the nozle-pipe or receptacle, which contains the usual set of valves; and from this receptacle another pipe H conducts the steam iuto the cylinder I. K, represents the piston of a peculiar construction, exhibited and to be described at Fig. 4. L, the condensing cylinder, which, contrary to the universal practice, I keep on a higher level than the bottom of the cylinder, for reasons which will be evident in the subsequent account of the process. The smaller shaded part represents a thin cylinder of metal, for which copper is to be preferred, supported by a skeleton within, composed of stouter metal, sufficiently strong to support the thin vessel against the pressure of the atmosphere. This thin vessel is the principal part of the condenser, and serves, in consequence of its sides being kept cold by surrounding water, to condense the steam without any actual injection. At the top of this condenser the valve, called the blowing-valve, is fixed, opening outwards; and there is also a buoy or float which serves to keep the water about one foot high in the bottom of the condenser. M, represents a pump, which supplies the furnace with water, and regulates the engine in the following manner; one extremity of a pipe terminates in the condenser L, and the other passes through the external part A, of the furnace, to the top of the dome. The pump, of which the piston is solid or imperforated (a valve being placed in the upper part of the pipe to prevent the return of water to the condenser,) is raised by the plug-tree, which acts upon its handle, but

its return is produced, and steadily regulated, by the weight P. At Q, in the pipe below the pump, is a cock, which, being set partly open, permits the water from the pump to pass in such quantity as may be found most suitable. The tail of this cock is connected with a rod passing from R, the safety-valve, by which means if at any time the steam should exceed the pressure of that valve, and lift it up, the cock will be more or less closed or shut, and diminish the production of steam by limiting the supply of water. N, the air-pump, communicating with the condenser, which is required to be worked till the water within is purified from its elastic fluids, after which it may be detached from the apparatus. O, the lever-beam, parallel motion as usual. S, the fly-wheel. T U, an apparatus for the still more effectually equallizing the power of the engine; it is composed of a circular tube, in each end of which is fixed a valve, opening outwards, and in the cross-pipe which joins the extremities and communicates with T V. There are two valves opening inwards, the first mentioned or lower curved pipe does not communicate with T V, but is partly filled with mercury, whence it follows, that when the beam loses its horizontal position, the mercury running towards one end of the curved tube drives out the air before it, and, leaving an enlarged space behind it, produces a partial vacuum in the pipe T V; and so likewise in its return it drives out a portion of air from the other leg, and operates to increase the vacuum in T V by the communication between its enlarged space and that tube through the opposite side valves. Thus the tube or pipe T V may be applied to any of the working operations distinguished by the name of suction; and thus also will the mass of mercury, according to its relative position on one or the other side of the working-beam,

beam, produce an equality in its action by opposing the strong, and assisting the weak parts of the pressure.

To render this description more perspicuous, I will now describe the method of working the engine. Water being introduced into L, part thereof enters the condenser to the height regulated by the float; the fire being lighted in the furnace heats the dome B; which dome being made thick, otherwise the heat of the furnace being duly regulated, the heat or temperature of the metal can never rise to ignition, or a luminous heat. The cock Q, underneath the jack-pump, being then turned, a portion of water is injected upon the dome, and being immediately converted into a steam, blows or drives the air out of the vessel E, and the condenser, and the lower part of the cylinder, and the whole internal cavity of the machine through the blowing valve; for which purpose the feeding and condensing valves in the nozle-pipe are to be opened as usual. The piston is now supposed to be down, and the engine is ready for working. The supply of water to the dome being kept up as before described, it immediately starts up on shutting the valve that leads to the condenser. The steam enters beneath the piston through the steam-valve and nozle F; which valve, upon the ascent of the piston, is shut by the plug-tree at the same time that the upper valve leading to the condenser is opened, and the steam rushing up comes in contact with the cold sides of the copper condenser, where it is instantly reduced to water. The permanently-elastic fluids having fallen to the lower part of the condensing-pipe, where they were drawn out by a stroke of the air-pump, the piston must consequently descend, and, by a like alternation, be again driven up; in which manner the operation will proceed until after a few strokes. The water within the engine will by this distillation have been deprived

deprived of all its permanently elastic fluids. At this period the air-pump is to be detached by taking out the pin which connects it to the plug-tree, or by any other simple means, and in order to prevent other air from accumulating from new water which may be introduced into the condenser. A small snifting valve is fixed in the piston, as near as convenient to the piston-rod, and through which valve this air is blown by the steam in the usual manner; hence, by working the same water over again, and keeping the condenser above the cylinder, we are enabled to work without an air-pump as is usual, and have the great advantage of keeping the whole of the parts upon which the steam may act at or above the temperature of boiling water, which has never yet been effected, and by which consequently the engine must acquire a great increase to its power.

Fig. 4 represents a newly-invented piston. The bottom of the piston H projects about two inches, forming a chamfered face in an obtuse angle with the axis. Upon this chamfered face is placed a wedge-like piece, composed of the different segments of the circle, ploughed and tongued into the extremity of each other with accuracy, and ground to fit the cylinder and inclined face of the piston. I, represents a compressing ring, which applies itself to the upper face of the said wedge-like piece by a chamfered face, similar to the piston beneath. The re-action of these faces respectively upon the wedge-like piece, causes it to beat outwards, and remain constantly in contact with the cylinder.

Fig. 2 presents a view of a steam-engine with my improvements, of which the cylinder is not connected with the furnace, and the furnace itself is made so large as not to require any additional vessel E, as shewn in Fig. 1. (To proceed with Fig. 2.) B, is the condenser, surrounded

rounded with cold water. C, the small feeding-pipe, with its cock attached to the safety-valve. F, the steam-cylinder, having the piston inverted, and the steam introduced at top; the air-pump, similar to that in Fig. 1, is fixed at H. I I, is the fly-wheel, with its connecting crank, and the operation of this engine resembles that of the former so closely, that a particular description is unnecessary.

Fig. 5 represents a conical hollow cock or valve, the lower end of which is closed; it has a pipe D, soldered to the upper part, which communicates by three or more side holes into E, a hollow conical socket, with both ends open, and ground to fit the corresponding conical part. When these two pieces are separated, there is a free passage for steam, or any other fluid, either inwards, through the external part, or from the internal part outwards, but when they are applied together the concave part of E effectually closes the holes in D.

Fig. 6, side-view of a furnace for generating steam, in the form of a wheel, particularly adapted to produce power for machinery by the application of waste heat from founderies, breweries, &c. A, the cast-iron or metal wheel or shallow cylinder, in which are fixed two ends with vanes, resembling an undershot wheel upon its external circumference. See also Fig. 7. This cylinder is placed on its horizontal hollow arbors or axles in the flew of a chimney, in which it is so closed up that the ascending current of heated vapour passing on one side, and acting upon its vanes, must carry it round, and heat it on all sides alike. Water is introduced at B, and the steam passes off at C, where it is employed to work the steam-engine here annexed, or any other steam-engine. The joinings are seamed in the usual manner, and the motion rendered easy by friction-wheels, parti-

cularly

cularly under the large hollow axis. The steam-engine, Fig. 7, in its structure and parts exhibits other of my said new improvements. E, is the pipe for communicating steam. The cylider F H consists of an upper part F, kept hot and separated from the lower H, by G, a ring of wood, which being a non-conductor of heat prevents its communication from F to H. I, is a cylindrical vessel of wood, furnished with metallic rings, surrounding its upper and lower extremities, so fashioned as to admit of the packing described in Fig. 4; one of which constantly acts against the part F, and the other against H, in the cylinder. At M is the steam-valve, for introducing steam above the wooden cylinder. K, is the barrel of the air-pump, fixed in the vessel I, and consequently moving up and down with it. L, is the piston-rod of this pump, which is fixed and operates by its relative motion. The valves of this pump and piston open downwards, but the top valve S opens upwards, and remains either open or shut, according to the last pressure it may have suffered. R, is a rod, passing through a stuffing-box, and communicating with a beam and counterpoise N, and serving to assist the rise of I in the cylinder.

The operation.—When the piston is up, the whole of the engine below I is to be filled with water; the steam-valve M being then opened the vessel I is pressed down by the steam, and part of the water flows out through the valve P. At the lower end of the stroke an injection is suffered to take place by any of the well-known simple methods. Into the space between L and S a vacuum begins to be formed by condensation, and which is soon completed by the rushing of the steam into the air-pump, where the condensed water is received, and passes out through the valve in the piston and the side valve T. The valve S, which was opened by its descent

descent upon L, continues open till its approach to the top of the cylinder, where it is again closed, and by the usual operation of the gear the steam-valve is again opened; previous to which last operation the pressure of the atmosphere must again have completely filled the whole cavity of the engine through the valve O. The subsequent descent of T will therefore exclude a like quantity of water through P, and in this manner the alternations will be incessantly continued.

Among the advantages of this engine, it is evident that the constant heat of F and I, which can never come in contact with the cold water, and the increasing heat of the water in I, which soon acquires a high temperature, and then continues its place by its diminished specific gravity, must tend in the highest degree to prevent the wasteful condensation of steam, which is so remarkable in captain Savary's engine, of which this construction in its several parts and the disposition thereof is an improvement.

As the fire passing up the chimney in various manufactories is very considerable, and much more than sufficient to work an ordinary steam-engine by condensation as usual, I do in such cases load the safety-valve, and construct the engine of the requisite strength to bear an elastic action of from fifteen to one hundred and fifty pounds on the inch, and upwards; and in this manner I work by its elasticity only, and suffer each supply of steam to escape into the air after it has performed its office. By this means the power of a four-inch cylinder may be made to equal that of a cylinder of one foot, &c. whereby the engine will be considerably more simple, cheap, and portable, and require less room.

Lastly, I must here observe, that the method of generating steam, by projecting water upon a heated metallic

or other surface, is not claimed by me as a new invention to its entire and absolute extent, but only so far as the new and convenient structure of my furnace, and the regulated application of the heat as herein before described and invented by me, do justify my claim to the exclusive privilege thereof.

And as a farther instruction to the engineer in this respect, I do hereby state and declare, that the principal novelty or leading characteristic of this part of my said new invention consists in disposing the parts of the apparatus, and working so that the heat shall not be great enough to decompose the water, and thereby separate it from the elastic principle called inflammable air.

In witness whereof, &c.

Specification of the Patent granted to GEORGE BODLEY, *of Exeter, in the County of Devon, Iron-founder; for a certain portable Stove or Kitchen for the Purpose of dressing Victuals.* Dated February 27, 1802.

With a Plate.

TO all to whom these presents shall come, &c. NOW KNOW YE, that in compliance with the said proviso, I the said George Bodley do hereby declare, that the nature of my said invention consists in the mode of constructing the portable stove or kitchen, and the manner of communicating the heat to the oven and fountain, or hot closet; and that my said invention, together with the manner in which the same is to be performed, are particularly described and ascertained in and by the several plans or drawings hereunto annexed, marked respectively

spectively Fig. 1, Fig. 2, Fig. 3, Fig. 4, and the several explanations or decriptions thereof herein-after mentioned, and referring thereto; that is to say:

Fig. 1 (Plate XIX.) represents the front-view and external parts of a portable stove or kitchen, which may be placed as shewn in a chimney; M M M, represent the mantle and jambs of the chimney. A A, the front of the stove. B, the top of the stove, forming a hot plate. C, the door of the oven. D, blank door before a fountain or space for a hot closet. E, top of the fountain or hot closet. F, the cock of the fountain. G, the fire-place. H, the door for introducing the fuel. I, the ash-hole. K, the cover of the fire-place. L L L, holes with plates fitted to clean the flue.

Fig. 2 represents the internal parts of a portable stove or kitchen. A, the oven. B, the hot closet or space for the fountain, to which steamers may with great advantage be applied at discretion. C, the fire-place. D, the ash-hole. E E, the sides of the fire-place and ash-hole. F F F F, the course or direction of the smoke and heat in the flue, which, ascending from the fire, passes over the oven, descends by its outer side, returns under the oven, ash-hole, and fountain, or hot closet, and ascends on the outer side of the latter through the upper part of the flue F into the chimney.

Fig. 3 represents the front and external parts of the stove without a fountain or hot closet. A, the front. B, the top, forming a hot plate. C, the door of the oven. D, the fire-place. E, the door for introducing the fuel. F, the ash-hole. G, the cover of the fire-place. H H H, places for cleaning the flue.

Fig. 4 represents the internal parts of Fig. 3. A, the oven. B, the fire-place. C, the ash-hole. D D, the

sides of the fire-place and ash-hole. E E E E, the course and direction of the smoke and heat through the flue, by means of which the whole heat is conveyed with the greatest advantage in a single stream round the oven and fountain or hot closet, as represented in Fig. 2; or round the oven, and under the ash-hole ascending through the upper part of the flue E into the chimney, as represented in Fig. 4. The course of this flue may be reversed, as will appear by comparing Fig. 2 with Fig. 4, the construction of some chimnies requiring such change of position.

This portable stove or kitchen is made of cast-iron plates fixed together with wrought-iron screws, or any other convenient fastenings, or it may be made wholly of wrought iron, except the sides and back of the fire-place and sides of the ash-hole, which are lined with brick or stone, set in mortar or loam, and the external sides or ends, and back of the stove or kitchen, are also commonly made of wrought or cast iron; and when so made it may be used in the open air, or it may be fixed in a chimney. Its dimensions may be varied, and made larger or smaller to suit the convenience of the purchaser. The meat dressed in this oven is equal if not superior in flavour to meat roasted before the fire in the common way, the cooking is attended with less trouble, and a very great saving is made in the article of fuel.

In witness whereof, &c.

Specification of the Patent granted to GEORGE ALDERSON, *of Carnaby-street, in the Parish of Saint James, Westminster, in the County of Middlesex, Lead-pipe manufacturer; for a new-invented Manufacture of Metal Pipes, the same being Lead lined with Tin, in a Manner, and by a Process or Processes entirely new, to be used in all Cases to which Lead Pipes are applicable.*

Dated January 26, 1804.

TO all to whom these presents shall come, &c. NOW KNOW YE, that in compliance with the said proviso, I the said George Alderson do hereby declare, that my said invention of a new manufacture of lead-pipes lined with tin, together with the manner of making the same, is described in the words following; that is to say: I provide moulds of metal or wood, or other fit material, of different lengths and diameters, according to the length and substance of the pipes I am about to manufacture. These moulds are in two pieces, being divided longitudinally, and are nearly similar to those generally used by plumbers for casting their pipes. I firmly attach them to the ground, in a vertical situation, by screws and wedges; and into the centre of the moulds I introduce a moveable polished iron rod maundrell or core, the lower end of which goes with a shoulder into a hole made to receive it in the bottom of the mould, and the upper end terminates a few inches above the top of the mould in the shape of a hook or ring. This iron rod maundrell or core I make of such a size as to leave a space all round between it and the mould, sufficiently large to receive the fused metal to form the pipe. I also make a small collar near the top of the last mentioned iron rod maundrell or core,

core, in order to keep it in the centre of the mould, with two holes made in it, one to pour in the melted metal, and the other for the escape of the air. Having thus arranged the mould for casting, I then pour in the melted lead or metal. As soon as the lead or metal is set, I draw out of the lead the iron rod core or maundrell by means of the before-mentioned hook or ring, either by pullies, levers, or other proper contrivances for that purpose, and I immediately substitute a similar iron rod core or maundrell, as to length and figure, but of smaller diameter, thereby leaving a space sufficiently large to receive the melted tin all round between the newly-introduced iron rod core or maundrell, and the lead or metal already cast. I then throw about as much resin in coarse powder as will lay on a shilling into such space, which, by the heat of the lead, will instantly be melted, and run to the bottom. I then pour the melted tin into the space so left to receive it: the resin will float on its surface, and consequently as the tin rises anoint the tin in every part, and act as a flux, and unite the two metals. As soon as the tin is set, I draw out this last-mentioned iron rod core or maundrell by the means before mentioned. I then open the external mould, and knock out the cast pipe, which, when quite cold, is ready to be submitted to the operation of drawing.

From what has been already said it will be easily observed, that the foregoing operation may be reversed; that is to say, the tin pipe cast first upon a small core, and in a small mould, and that core with the tin upon it afterwards removed into a larger mould, the resin applied, and then the lead cast round it, or the tin pipe need not be cast on purpose, but may be cast and drawn, or soldered and drawn, to any length

length, and afterwards cut to the length of the moulds, made perfectly clean, and the lead be cast upon it as aforesaid, thus answering the purpose of a core.

When the short thick cast pipe is produced by any of the aforesaid means, it must be drawn to the proper length and substance by any of the common and well-known processes, but must have a polished iron or other metal rod, or a boss or triblet, upon a thick wire in the inside, for the purpose of keeping open, preserving, and perfecting the inside of the pipe; which rod, boss or triblet, must afterwards be drawn out.

Lead pipes may also be lined with tin, by drawing the tin pipe to the required thickness on a rod or maundrell, and then inserting the rod with the tin upon it into a lead pipe already drawn, which is but just large enough to receive it, and passing the whole in this state through a collar or two, such as are used for drawing the pipe, which by diminishing the diameter of the lead-pipe will as it were burnish or press it on to the tin with so much force that they cannot easily be separated. Although this method will answer the purpose, it is by no means so good as the first-described processes, inasmuch as the metals are not so well united. But I conceive I have given such a description of my invention as will enable every workman to put the same into complete practice; yet, from the nature of the manufacture, it is obvious that it will admit of variations and modifications as to the size of the moulds and machinery, and mode of working, which it will be needless here to describe, as they must be evident to every intelligent workman.

In witness whereof, &c.

Specification

Specification of the Patent granted to WILLIAM PETHER, *of the Parish of Saint Michael, in the City of Bristol, Artist; for certain Methods, on a new Principle, either for preventing or curing Smokey Chimnies.*

Dated August 4, 1804.

With a Plate.

TO all to whom these presents shall come, &c. NOW KNOW YE, that in compliance with, and agreeably to, the true intent and meaning of the said proviso in the said letters patent contained, I the said William Pether do, by this instrument in writing, under my hand and seal, hereby declare that the following is a particular description, and ascertains the nature, of my said invention of certain methods, on a new principle, either for preventing or curing smokey chimnies; *viz.* The new principle, or *Petherian system*, as applied for the prevention or cure of smokey chimnies, operates by placing a machine with valves either in or on the top, or the sides of a chimney, that the rising smoke may push and force open the doors to escape into the air, without being able to return, as usual, down the funnel of a chimney into the house by the pressure of moist, heavy, or windy air, or even by the force of a hurricane; for, as the machine is well closed at the top, one or two of the valves therefore will always shut close when opposite to the wind, and the others will instantly open to the leeward, whereby the smoke issues out freely, and disperses into the atmosphere. On this principle certain methods have been invented by the patentee to cure all such smokey chimnies as are built with proper-sized funnels, able to emit smoke in proportion of time as it rises from the

the fire, and that are constructed also with narrow or moderate sized mouths at the fire-places, or such as may hereafter be contracted by any means to proportionate and adequate dimensions. But for such chimnies as are very wide below at the hearth, as or like to kitchen chimnies, some improvement, on an old principle, by alteration of contracters or concentrators of air, have also been invented, to unite their effect with the machinery that is placed above, whereby fires are enabled to burn clearer, therefore, with less quantity of smoke; and by expanding the rarifying force more, increase its power to lift and drive up the sooty vapour, with greater velocity, through the valve apertures into the open element of air.

Delineation and Description of the upper valvelar Machines called Petherons.

Fig. 1, (Plate XX.) represents a front-view of a valve-machine, constructed with four sides, and a flat top, projecting over each side, for the rain to flow off properly, the five parts to be soldered together. From each of the four sides hangs a valve, of a triangular shape, suspended by a strong brass wire, put through two pieces of copper metal, bent, to reserve holes for the wire to turn in, and which appear as at A. The copper-bent holes or rings, to be well soldered under the wire to the valve; also the two ends of the brass wires that turn upward to be strongly soldered to the Petheron, about an inch or more above the edge of the valve. This part of the machine should be well executed to swing very free and easy by the least impulse of smoke, or by its own power of gravitation or pressure of the air. Over each valve is a long quadrangular hole, intended for part of the smoke to escape, and to prevent their undulation

where air rises or descends in the funnel after the fire is extinguished. A small brass wire is put across each aperture, to prevent wind from driving the valves into the machine. Under the lower angle of each is a piece of tin projecting, well fastened, to prevent the machine sliding down too far into a chimney; four or five inches deep is sufficient to prevent wind from dislodging or blowing it away. It should fit in close, and be farther secured with mortar by a bricklayer.

Fig. 2 is an angular view, to shew the top and two sides, in perspective, of a similar machine to the first-described.

Figs. 3, 4, and 5 represent others on the same new principle, only varying in the shape of the valves, and one with a triangular shape as one of the four sides at the top, for the sake of variety and ornament.

Fig. 6 represents a valvelar machine to place into the side of a chimney. One to be placed on each side, constructed with four sides, and a back with a valve to it, suspended also like the first-mentioned Petheron. They are to be fastened in with brick-work, and a flat stone or other material placed on the top of the funnel, and closed with mortar, to prevent any vertical pressure of the air.

The aforesaid variety of machines are described to shew specimens of certain methods, on the new principle, and many more might be added if necessary for the public or the patentee. The Petheron first described is chiefly used, and recommended, both from theory and experience, to be the best calculated for the prevention or cure of smokey chimnies. The said machinery may be constructed of different metals, and even of potter's clay, or wood; or made of various shapes and sizes to put on, in, or to the tops or sides of chimnies. Valves also

also may be made to open upward, but they please better in speculation than by experiment. Iron-tinned, usually called tin-ware, should be used, being cheap in the purchase, and easiest to manufacture. These several sorts of machines are mentioned chiefly to shew that variety on the same principle may be constructed, and to prevent attempts to infringe on the invention and property of the patentee by ignorant or dishonest adventurers.

Contracters or Concentrators of Air operate by diminishing the area of air at the fire-place of a chimney, thereby concentrating its force of pressure in, through, and near the fire, with windy activity to enliven or increase it to any degree of heat, diminish smoke, and give energy to the expansive rarifying power of that wonderful element.

Fig. 7, called an enlivener, made of tin-ware, to fit close to the inside of the jambs and mantle-piece of a fire-place. Fig. 8 is called an inflamer, to fit in close to the inner sides and top of the enlivener; this serves as a blower to the fire. Fig. 9, to put close to the sides and top of the inflamer, but only when the fire is to be put out; it may therefore be truly called the extinguisher. Fig. 10 shews the form of a foot, six to be the number, in order for the whole apparatus to stand firm and steady. Fig. 11 shews the three parts put close together, as they are intended to stand before the broad mouth of a fire-place. Thus accidents from fire may be prevented at night, dust diminished, and the whole machine be easily applied, or conveniently taken away.

In witness whereof, &c.

Observations on Alabaster or Gypsum as a Manure.

By Mr. RICHARD WESTON, *of Leicester.*

Communicated by the Author.

THIS new manure appearing as an uncommon phænomenon in the Annals of Agriculture, it cannot be an uninteresting matter to disperse the knowledge of its valuable qualities, and how it came to be known, especially as it is now making a rapid progress into every enlightened country where the farmers are not above being taught from the ingenuity, labour, and researches of others, and of all the modern improvements in agriculture no one appears to be of greater consequence.

One of the most pleasing and beneficial circumstances attending it is, that although it is produced in various parts of Europe, from which it could be imported into this country, yet it is also found in many counties of England, as Leicester, Derby, Nottingham, and York, in great plenty, and without doubt in many other parts if searched for, and cannot fail of being of particular benefit to those places, near to which it is found, in the article of carriage; but from the small quantity required that will be no great impediment, for the Americans imported great quantities from France, which cost them three shillings a bushel.

It is to the indefatigable researches of Mr. Mayer, a German clergyman, that we are indebted for this valuable fossil as a manure; but where his residence is I have not yet been able to discover, nor have seen any of his writings concerning it.

In the year 1768 he first discovered its virtues as a manure, and its reputation soon caused it to be tried in various parts of Germany.

From

Thence its fame spread to Switzerland and France. Near to Paris are several hills of it, named Mont Martre, whence the Americans transported it to their country, and its reputation soon spread it through that continent, even to Quebec.

As a proof of which, I have taken an account of the following experiments, from a book printed in that city, in French and English, but first published in various periodical works in Philadelphia, Pennsylvania, &c.; and from those American publications it was introduced into England, after having made a circuit of nearly ten thousand miles.

Description of the best Sort, and Method of proving its Quality.

From the experiments made in America, it is found, that that which is produced near the surface of the ground has not the qualities necessary for vegetation in so powerful a manner as that which is dug deeper, on account of the sun, frosts, and atmosphere weakening its virtues, and that the lumps composed of flat shining specula are preferred to those which are formed of round particles like sand; but that all kinds of gypsum, however different in exterior form or appearance, have a perfect resemblance in their chemical and essential qualities.

To try its quality, some should be pulverized very fine; then put dry into an iron pot placed on the fire, and if it be good it will soon boil, and great quantities of the fixed air will escape by ebullition.

Method of preparing it.

The usual method of preparing it is, by first stamping it in a stamping-mill, and then grinding it in a common grist-mill; but the finer it is ground it is so much the better,

better, nor must it be calcined, and the fresher from the quarry the qualities will be the stronger.

If you have not a stamping-mill break it with a large hammer, and then sift or grind it.

The Manner, Quantity, and Time of sowing it.

The method of putting it on the land is sowing it in the broad-cast manner, as you sow corn, and the only care necessary is to make the distribution as equal as possible. A day inclining to rain is to be preferred for sowing it; but if the weather be very dry it ought to be moistened before it is sown, to prevent it from blowing away, and the distribution being unequal.

From a variety of experiments already made, from six to eight bushels to an acre seem to be the most approved quantity for grass or clover; but when only half of the quantity has been used, its effects have been very visible, and more productive by three tons to an acre than some of the same land left unplastered. One farmer mentions that he used nine bushels.

It has been sown in every month by various persons from March to September. By some April is recommended, and has succeeded beyond expectation at Newton-Harcourt, in Leicestershire, sown then, and the lands have ever since shewn their superiority, although now twelve years ago, for the truth of which I can vouch, having several times since seen the land.

If clover be sown with corn it must be put on the clover as soon as the corn is carried off the ground, or when put into cocks, and then a small space will be left down the middle of the land, which may be plastered when the corn is carried.

Its

Its Time of Operation and Duration.

Its effects generally appear in ten or fifteen days after sowing, if rainy weather, after which the growth of grass or clover will be so accelerated as to be fit to cut in about six or eight weeks, but a small part should be left unplastered to shew the difference.

Land has retained visible marks of its superior fertility from five to seven years after being plastered, and in some places from seven to ten.

In Philadelphia it has been practised twelve years, and by one farmer fifteen.

Experiments on various Soils.

It should be sown on dry land not subject to be overflowed, and it is difficult to say on which sort, sand, loam, or clay, it has answered the best.

Its effects are the soonest visible on sandy ground, and the latest on clayey; therefore on strong clayey lands it may not be improper to lay a larger quantity, or a few bushels more the second or third year.

Its Effects on Grass Lands.

By various experiments it operates on all other grasses as well as on red or white clover, and acts as an immediate manure on them.

Uplands which were worn out, and from their sandy texture were abandoned, have now become more valuable than the finest bank-meadow lands. In Pennsylvania, from sandy heights they annually cut two crops of grass, and after six years the produce has not abated.

Comparison between Dung and Plaster.

An experiment was made by laying farm-manure two inches thick on worn-out land. Plaster was sown on some

some of the same land, each was mowed twice the first year and once the second, but in every crop the plaster produced the most.

Some farmers are so prepossessed with its superior qualities, that they prefer giving three shillings a bushel to lay it on grass land rather than draw out their dung, but yet I would recommend to those farmers to use the manures, if they plastered the land afterwards.

Experiments on Barley and Clover.

On barley and clover plaster was sown in April, just as the barley was above ground, diagonally across a field of three acres, about eight feet wide, little or no difference could be observed in the barley; but in September following there was a striking difference in favour of the plaster, and the clover would have afforded a good crop of hay, whilst the remainder was but indifferent.

Another experiment was made by sowing barley the year after the ground was plastered; at harvest the difference was astonishingly great in favour of the plastered.

Experiments on Buck-Wheat.

On buck-wheat it made it grow so rapidly that it fell down, and the crop was lost; but probably if only half the quantity of seed had been sown it might have had success.

On another acre of buck-wheat, following a crop of rye, which ground had been plastered on clover the year before, a very striking difference was observable in favour of the plaster.

Experiments on Cabbages and Turnips.

Plaster has been applied to crops of cabbages and turnips, and it has been found as equally effectual on them as on other crops: the time is not mentioned when it was applied

applied, but immediately before or after the planting of the cabbages or sowing the turnips seems the most proper.

Experiments on Clover.

Two bushels and a half of plaster to an acre was sown in March on clover, which had been sown the preceding spring, leaving a piece in the middle not sown. Where there was no plaster the clover was only about twelve inches high, the other part only thirty-four inches.

On a field of wheat of eight acres, six bushels of plaster were sown on each acre with clover seed at spring. When the wheat was cut, the clover was twelve inches high, and was mown in two or three weeks after.

In March eight bushels of plaster were spread upon two acres and a half of wheat-stubble ground, which had been sown the spring before with red clover, and yielded about the middle of June five tons of hay. A small piece of ground was left unspread with the plaster, to afford an opportunity of distinguishing the effects of plaster as a manure. From the experiment there appeared an increase of three tons and a half of hay, with the addition of nearly three tons more ready to cut, in all six tons and a half increase by the use of the plaster.

In April an acre of white clover was plastered, and produced a good crop; another acre unplastered afforded little but a few scattered weeds.

Experiments on Indian Corn.

On Indian corn it has been found of great advantage, by putting a table-spoonful to each hill as soon as it appears above ground, and eight bushels of additional corn were produced on an acre. Another experiment pro-

duced nine bushels extraordinary, and a third ten, and the corn ripened two weeks earlier.

As a spoonful to each hill appears to be a very small quantity to produce any effect, it is proper to mention, that Indian corn is sown or planted upon small hills similar to hops in this country.

Experiments on Rye.

An acre of clover, which had been plastered the year before, was ploughed early in October once, and sown with rye, which produced double the quantity, and of a superior quality to another acre unplastered.

An acre of white clover, which had been plastered with six bushels, was also ploughed once in October, and sown with rye; at harvest it produced ten bushels, and another acre unplastered only five.

Experiments on Wheat.

From various trials on wheat it is not possible to discover that it makes any difference when sown on the crop, but if sown on grass ground, and this ground turned up and laid down in wheat, the advantage it is of to the crop is amazing: probably six bushels to an acre are not a sufficient quantity for wheat or other corn; but it does not appear that any person has yet applied more except one farmer, who put nine bushels on grass land.

On

On the Criterions or due Discriminations of Cyder Fruit. By the late THOMAS SKIP DYOTT BUCKNAL, *Esq. of Hampton Court.*

From the TRANSACTIONS of the SOCIETY for the Encouragement of ARTS, MANUFACTURES, and COMMERCE.

The Thanks of the Society were presented to the Author for this Communication.

THE following is a paper on the criterions and due discriminations by which the valuable cyder-fruit may be ascertained, referring to my last and preceding papers on varieties *.

Report says, cyders are not well produced out of the cyder countries. Were it said they are not well made, the assertion would be just; but it is a mistake to suppose that cyder cannot be made in perfection out of those situations. Only choose the proper soil for the fruit, see it ground down to a perfect smoothness, rind, pulp, kernels and all; duly fermented.—Tun the liquor at the exact point of time with regard to settling, which is well understood in the west, and not attended to elsewhere; and do not rack it too much. Keep the liquor in quantity to a good age; and I take the liberty of maintaining, that there are places in Hertfordshire capable of producing as good and fine cyder as any in Herefordshire.

I was once asked, what are the impediments to a more general fine crop of fruit? My reply was, the coldness and uncertainty of the climate, injudicious planting, with inattention and neglect in those who have the management of it. As for planting and guarding against cold,

* Published in the preceding volumes of this work.

 enough

enough has been said on that subject through the whole of my treatises. It has been observed the cyders were better one hundred years ago than they are now. That may have been the case; and I should account for the differences as follows:—when the gentry and superior yeomanry of the country depended on barley and fruits to make an agreeable beverage for their friends, it is natural to suppose that they personally superintended the business themselves, and received great satisfaction when their labours were attended with success; whereas, when Port wines became the luxury of the country, cyder of course naturally fell into disuse at the better tables. Hence the masters of families were no longer zealous to produce fine potent liquor, and giving it as cyder, that being assigned to inferior uses.

Undoubtedly, where cyder is the general drink of the country, great quantities must be raised for that purpose; and it is done at so low and easy a rate, as to be sent from the mill to the neighbours cellars under three half-pence the gallon. What I am attempting is, to be able to produce at a certainty a fine generous liquor, such as may do credit to the name of the cyderist, and which will depend much more upon attention than is generally imagined.

After having expatiated on the old and new varieties of the valuable cyder-fruits, in the last volume of the Society's Transactions *, I have nothing farther to offer for the purpose of closing the orchardist, than to give them the marked criterions as follows:

My friend, Thomas Andrew Knight, Esq. has made good discriminations in his Tract on the Apple and Pear. The Somerset report has farther extended the subject.

* Published in the second volume of the second series of this work, page 361.

I say,

I say, choose an apple naturally small, of a whitish colour, somewhat tinged with red, of a fine yellow pulp, with a certain degree of astringency, and as much saccharine matter as nature is disposed to produce; then observe if the cells are large, and full of ripe kernels; and further still, know whether the blossoms are patient of cold, and the fruit ripens well.

Such an apple, particularly if a new variety, properly ground down and duly fermented, must make good cyder; and both as to profit and use, be valuable in any neighbourhood, or as an article of trade. The foundation is now so well laid, in the seedling-beds in the county of Hereford, that within five years there will be more than one hundred new valuable varieties produced. I last autumn saw two most beautiful new apples, of the first year's growth, upon the Grange estate, and which decidedly obtained the Hereford premium: they were seedlings of high promise. There is an emulation among gentlemen of that part of the country which does them great credit.

Dr. Symonds gives several of these discriminations; and in addition says,—The flavour of a good cyder-fruit cannot be mistaken by a man conversant with apples, though difficult to be described; but, above all, he recommends to choose apples, the rinds of which have follicles, or cells, containing large quantities of essential oil, more particularly to be noticed in the old stire, golden pippin, and pauson, and from which Dr. Symonds conceives the cyder in a great measure derives its flavour. It is to be observed, that the old pauson, woodcock, and red musk, are generally large apples. The old scorched-harvey is an exception as to the yellow colour; that being white, with a brown skin. There are other

other exceptions; but the material criterions are here enumerated according to the received opinion.

Had I formed these distinctions when I was a boy, I should then have said, take any apple bordering on the golden rennet or golden russet, and it will make good cyder, in consequence of supposing that the golden colour is of service. We had a fine apple, the royal pearmain; it was more flat and large than the Seville orange; it had a thin skin and quick taste, with much sweetness, and made fine cyder: but I presume that variety is now over, as I have not seen one of them for many years.

In the October of 1801, which I spent in Kent, I was shown a new apple. The tree is handsome, and the fruit has most of the criterions, but does not ripen well, which is a great defect in cyder-making; we named it *The Bland of Hartlip*. It has the macula, or follicles in the skin, more visible than on the golden pippin. I intend examining it with attention at a future period, as it is not possible to form a certain judgement on it for some years. My reason for mentioning the Bland of Hartlip is, to prove that the idea of searching after new varieties has made a general impression throughout the kingdom.

It was the custom formerly, if a new apple had many good points, but ripened late, to preserve the tree as a new variety, imagining that, as it advanced in age and acquired strength, the fruit would ripen the sooner, and consequently the cyder be richer. I should add to it, lay the land dry, and spread plenty of manure. These attentions would much accelerate the wished-for object of improving the liquor, as well as increasing the quantity of fruit.

Memoir

Memoir on the Sulphate of Magnesia. *By* J. Mojon.

(Concluded from Page 397.)

If we attentively examine all that takes place in the course of this operation, we shall be obliged to admire the sagacity of the inventor, and at the same time it will appear difficult to improve it in what regards either the extraction of the salt or the manner of obtaining separately the metallic sulphates, which hitherto had either been neglected, or decomposed with little profit.

In the first place, when whiting is poured upon the lixivium of the mineral, to saturation, this is not a sufficient dose for decomposing all the metallic salts which are in solution in it; and frequently the liquor contains, besides the sulphate of magnesia, a portion of the metallic sulphates which require to be separated from it; but if the lime is in excess, it then precipitates not only all the metallic oxydes, but in the same manner a portion of the sulphate of magnesia by the greater affinity which the lime has for the sulphuric acid, and in consequence less salt is obtained. In the second place, the copper is extracted by immersing plates of iron in the liquor; there is a loss both upon the copper which is obtained, and upon the iron which goes to replace the copper precipitated; and as, according to M. Proust, 100 parts of sulphate of copper are composed of 33 parts of sulphuric acid, 8 of oxygene, 24 of copper, and 35 of water of crystallization; that is to say, they contain about a fourth of copper; so, in order to have a given quantity of pure copper, it is necessary to decompose four times as much sulphate of copper.

We see from all this, that in this operation seven-eighths of the profit are lost, not including the quantity

of

of copper which remains still dissolved, and which is left in the solution; now it is proved that the surface of the plates of iron, when once covered by a quantity of copper, can no longer act upon the remaining copper and decompose it. According to this observation, it seems to me that the process which might succeed with the greatest advantage, and be substituted for the preceding one, in order to obtain separately the sulphate of magnesia, of iron, and of copper, is the following.

After having lixiviated the ore, which has previously been torrefied and exposed to the air, filtrate the lixivium, and evaporate it in a large copper caldron till a pellicle is formed at the surface of the liquor, which put for the present to crystallize in pans of glazed earthenware; after the crystals are deposited, decant the liquor, and pour it into the caldron, in order to evaporate it again to a pellicle; then put it to crystallize in other pans, and thus repeat the evaporations and crystallizations till all the salts are crystallized, separating every time the portion crystallized at different periods; the sulphates of iron, of copper, and of magnesia, not being equally soluble, nor retaining the same water of crystallization, do not crystallize at the same time, and have neither the same form nor the same colour. The sulphate of magnesia crystallizes the first, that of iron the second, the sulphate of copper the third; so that by the repeated evaporations and crystallizations we may obtain these three salts separately, but we cannot determine the number of the evaporations and crystallizations which this operation requires, nor the term at which the one or the other salt cystallizes, these salts not being always entire in the same proportion, nor in the same quantity with respect to the ore. If we attend to the crystallization when the blue crystals of copper begin to appear, that is to say,

say, to the third, fourth, and fifth, (as they are always the last to crystallize,) we unite together these last crystallizations which contain the sulphate of copper separated from the other salts. The first crystallizations containing the iron and the magnesia may be united together (always when we do not wish to separate the sulphate of iron, on account of its little value); we dissolve it in boiling water, we pour into the solution lime-water till the whole of the metallic sulphate is decomposed, which is easily perceived by pouring into it a little infusion of galls, which must not produce a black colour. After the lime has precipitated all the oxyde, we filtrate it, and evaporate the liquor to a pellicle; by this means we obtain pure sulphate of magnesia.

This process, of which I have given a rapid sketch, when well examined, is the only one which can separate the sulphate of copper from the two other sulphates without decomposing them; it is at the same time the most advantageous for such an operation; besides, it neither requires too long a period of time nor a great expense; and the profit which it produces in this case, the sulphate of copper being eight times more considerable than that which the copper precipitated by the iron gives, we are well indemnified for the trouble which attends this operation. In order to assure myself of its success, I have operated myself in the manufactory of M. Ansaldo; and, from the first experiments which I have made upon a small scale, I have been able to calculate the results which they promise in the large way, as well as their utility.

After having described the process employed for extracting this salt, analyzed it in all its parts, and indicated the correctness which appear to me to be the most

 proper,

proper, it will not be useless to examine its nature and its quality in comparison with those which are brought from foreign countries.

All the salts known in commerce by the names of Bitter Cathartic salt, English salt, Epsom salt, are extracted from the mother-waters of some salt-works, or from certain salt-springs, which contain in solution the sulphate of magnesia, mixed constantly with other salts: our salt, on the contrary, is produced, as we have observed, in the course of the operation, and is the result of several decompositions and new combinations.

It is proved by the analysis which the most distinguished chemists have made of the salt of England, of Spain, of France, of Germany, and of Italy, and which I have repeated, that all these salts, not one excepted, contain, besides the sulphate of magnesia, a more or less considerable portion of other salts; whilst that which is prepared at La Guardia, notwithstanding the most rigorous analysis, has not presented to me any other salt; it is composed of 0,32 of sulphuric acid, 0,19 of magnesia, and 0,49 of water. That which is prepared in the salt-works of France is a mixture of several salts, namely, 0,33 of sulphate of magnesia, 0,19 of sulphate of soda, 0,12 of muriate of magnesia, 0,6 of muriate of soda, and 0,25 of calcareous salts (see Chaptal, Elemens de Chimie, tom. I. p. 51, edit. 3.); so that it contains a little less than two-thirds of Epsom salt. The salt of Mont-Morot, which improperly bears the name of Epsom salt, is nothing else than sulphate of soda (Annales de Chimie, Tom. XX. p. 116); the salt which comes from Lorraine and the environs of Narbonne is a compound of sulphate of magnesia and sulphate of soda, like that of Bohemia; that of Seydschuetz contains, besides the

the sulphate of magnesia, muriate of magnesia and sulphate of lime; the salts of Sedlitz and of Egra are not more pure; and even the salt of Modena, which is in such great repute, is a compound of sulphate of magnesia and of soda.

Hence we may see how ill-founded is the opinion of those who, habituated to see the bad crystallization of the salt of England, of Spain, and of France, blindly imagine that the true sulphate of magnesia ought to be in small fine needles; whereas that ought always to be preferred which is crystallized in the form of quadrangular straight prisms, terminated by tetrahedral pyramids.

Wishing also to compare the quantity of carbonate of magnesia which our salt affords with that which is obtained from the salts of commerce, I dissolved separately in water a quantity of carbonate of potash; I obtained from that of La Guardia 0,45 of carbonate of magnesia, from that of Spain 0,37, from that of England 0,38, from that of France 0,22; for this reason, when it shall be wished to extract magnesia from these salts, it will be very advantageous to use that of La Guardia in preference to those which come from abroad, as the first contains much more magnesia; and in buying the latter we run the risk of purchasing sulphate of soda, and of employing uselessly an alkali in order to decompose them, of obtaining little or no carbonate of magnesia, and, finally, of having this last salt impure.

Second Memoir on Crude Platina; or first Series of Inquiries upon the new Metal contained in Crude Platina.

By Messrs. Fourcroy *and* Vauquelin.

(Concluded from Page 367.)

Manner of extracting and purifying the new Metal.

F. Although we have not at present any of the new metal left to present to the Institute, we shall however give them an account of the means whereby we have succeeded in obtaining it pure. We have already said that, after having heated the black powder of the platina with potash, and separated the latter by washing with water, we put upon the residuum muriatic acid, which, combining with the portion of the metal oxydated during the calcination with the alkali, assumes a fine green colour. We think that this green colour is not produced solely by the new metal, but that it is the result of the mixture of the muriate of iron, which is yellow, with the muriate of the new metal, which is blue.

In fact, in proportion as the number of the treatments is multiplied the green colour is diminished, and the blue augmented in intensity, and at last it is of a very pure and very rich blue.

The iron which is found in the first solutions proceeds from the chromate of iron decomposed by the potash, which slowly carries off the chromic acid.

When we have exhausted any quantity of the black powder by the means which we have described, and there remain only the metallic particles of which we have spoken above, we unite all our muriatic solutions, we evaporate them with a moderate heat to dryness, in order to separate from them the silex which is found in them

them in considerable abundance; we re-dissolve them in water, and filtrate; we then put into the solution, which, by the heat of the evaporation has passed into a fine red colour, plates of zinc and a little muriatic acid; shortly after the liquor becomes green, then blue, because the iron returns to the *minimum* of oxydation; at last the liquor becomes turbid, and deposits abundantly very brilliant black flakes. We recommend to add muriatic acid to the liquor, in order that a slight effervescence may continually take place, and that the new metal may not be able to apply and attach itself to the zinc.

When the liquor is white, and appears to contain no more metal in solution, we decant it; we wash the deposit with much water, and at last with muriatic acid, in order to separate the portions of oxyde of iron which might have returned with the new metal; by desiccation with a gentle heat, it becomes white, and assumes a pretty bright metallic lustre.

G. We arrive nearly at the same result by causing sulphurated hydrogene gas to pass into the weakened solution of the new metal containing iron, and afterwards heating the liquor: the iron is not precipitated with it, but it is found mixed with a small quantity of sulphur, from which indeed it may very easily be disengaged with the aid of a slight heat.

We have likewise succeeded in obtaining it pure, by treating with alcohol the residuum of its solution evaporated to dryness by a very carefully-conducted application of heat; the muriate of iron is altogether dissolved, and the muriate of the new metal remains in the form of a red powder, which may afterwards be decomposed by a slight calcination in a crucible of silver or platina. However, it must be confessed, a portion of this muriate dissolves in the alcohol at the same time with that of iron,

and

and in this respect this method is not so convenient as the preceding.

Properties of the new Metal.

H. This metal is white, nearly like platina; it is brittle, and may easily be pulverized. It is undoubtedly by this property that it communicates to the platina, which, when it has been prepared by the ordinary processes, is always more or less mixed with it, that hardness and rigidity which it is known to have, and which it does not possess in the same degree when deprived of it: when it has been precipitated from one of its solutions by zinc, and is heated strongly by the blow-pipe, it is volatilized into a kind of white fume, and disappears entirely. An experiment, of which we think we ought to give an account here, had already led us to suspect its volatility. After having separated by means of alcohol, as we have said above, the muriate of iron from that of the new metal, we decomposed the latter by a gentle heat, and we obtained three grammes and a half of a black powder, which already possessed an incipient metallic lustre. We put this powder into a crucible with borax, and subjected it to a strong heat, with the intention of melting it, in which we succeeded very well. We found in fact all the borax, and three or four small metallic masses adhering together, which had a white colour, a very lively metallic lustre, and which were brittle; but separated, as accurately as possible from the borax, they weighed altogether only three or four decigrammes at most.

We were thus led to suppose that a portion of this metal had been volatilized during the operation, with the aid of the heat to which we had exposed it, for we could not believe that the powder, which already appeared to us to be for the greater part in the metallic state, contained

tained still a sufficient quantity of oxygene to occasion this loss; and although the borax with which we had fused it retained a slight pearly-grey colour, it seemed to us impossible that so large a quantity of this metal could have combined with so small a portion of borax.

I. This metal pure, highly divided and calcined with an equal quantity of potash, oxydates itself at the expense of the atmospheric oxygene, and the result is a greenish mass when the mixture has cooled; when this mass is washed in water, the potash dissolves in it, carrying with it a certain quantity of oxyde which communicates a red colour to it, and which may be separated from it in the form of reddish flakes by the addition of an acid. If we afterwards pour concentrated muriatic acid upon the washed matter, it dissolves a part of it, and assumes a very intense green colour, but which afterwards becomes blue by its mixture with water; so that the green colour which we attributed above to the mixture of the muriate of iron with the muriate of this metal is not exclusively owing to the iron, since the new metal in the pure state presents it also; though it is very true, that when it contains muriate of iron the blue colour produced by the water is never so pure.

K. No simple acid attacks the new metal; even the nitro-muriatic acid has but a very feeble action upon it. We do not exactly know the quantity of this acid which would be required in order to dissolve it; we can only assert that, under the most favourable circumstances, three hundred parts were far from being sufficient. It may therefore jusly be asserted, that this metal is that which of all others opposes the greatest obstacle to the action of the acids; probably because its affinity for oxygene and that of its oxyde for the acids are very weak; it is also one of those bodies which saturate the acids very imperfectly,

imperfectly, and its salts do not become soluble without a superabundance of these solvents.

Whenever this metal is dissolved directly by the nitro-muriatic acid, it communicates to the resulting liquor a red colour, inclining a little to the rose-colour. When this solution is evaporated, it often assumes, towards the end, when it begins to be considerably thickened, a very pure blue colour, and becomes red again by a perfect desiccation.

L. When this metal has been oxydated with the aid of potash and of the atmospheric air, it easily dissolves in the mineral acids; the sulphuric and the muriatic becomes green or blue, according as they are concentrated or diluted with water, but the nitric always assumes a red colour when it is concentrated.

Its solutions are precipitated of the same colour by the alkalies; thus the red are precipitated red, and the green green, by the same re-agents; but in the first case an excess of alkali re-dissolves the precipitate, which does not happen in the other.

When these solutions are exempt from iron, they experience no alteration from the prussiate of potash.

The alcoholic infusion of galls, aided with a little alkali, causes the solution to pass into a violet colour, and forms in it a red-brown precipitate.

The green sulphate of iron renders the red solution at first violet; it afterwards passes into a green, and deposits a black powder with the aid of heat.

Sulphurated hydrogene and the hydro-sulphurets cause it to lose immediately almost all its colour, and there is afterwards deposited from these mixtures, with the aid of heat, a powder of a brownish-black colour.

Most of the metals, and especially zinc, cause the red colour speedily to disappear and to pass into a yellowish green;

green; the latter colour is dissipated and destroyed in proportion as green flakes are precipitated.

The blue muriatic solution comports itself somewhat differently from the red with the re-agents. Oxygenated muriatic acid gives it a green colour, which passes into the red only by heat and evaporation. Hydro-sulphurated water destroys the blue colour, separates blue flakes from it, and leaves it of a red colour, in which a greenish tinge is perceptible.

Zinc changes its colour to a green, afterwards to a reddish yellow; at last the liquor is altered, depositing black flakes mixed with some green ones.

All these experiments, and many others which we omit as superfluous, clearly prove that the new metal has but very little attraction for oxygene, since it combines with it so difficultly, and relinquishes it so easily when it contains it, under the action of a multitude of other bodies, several of which do not hold the first rank among the combustible substances.

They equally shew that it is susceptible of combination with different proportions of oxygene, whence results its various colours; for it appears to us beyond doubt, that the blue and red tinges are really owing merely to unequal quantities of oxygene in this metal; that of its oxydes which passes with the water in distillation which gives it so singular an odour and so strong a taste, and which is volatilized at so low a temperature, is also, according to all appearance, another modification depending upon the same cause. But we think that the green colour is not produced by a peculiar chemical state; it is rather the result of a physical effect, since, by the mere addition of water, it is made to pass into the blue, and *vice versâ*.

Our researches instruct us also respecting the state in which this metal exists in the black powder which platina

 leaves

leaves after its solution in the nitro-muriatic acid: it is certainly in the perfect metallic state, and free from almost all combination, unless it should be with a small quantity of platina. We formerly suspected that it was united with the iron and the chromium which accompany it in this powder; but we were mistaken, for in reality the chromate of iron is only mixed with it.

Finally, these experiments shew us that its oxydes and the solutions of the new metal must have a very violent action upon the animal economy, at least if we may judge from very strong analogies: in fact, the facility with which they are decomposed, their acrimony in the mouth, the black spots which they form upon the skin and upon vegetable substances, are so many circumstances which indicate that this is the case.

Before we conclude, we must mention that the details given in this memoir comprehend as yet only the most singular and the most characteristic facts respecting the new metal which accompanies platina. The investigation which we continue with ardour and perseverance does not as yet permit us to shew the relations which it presents with platina and the other metals. These objects, as well as several others, shall be treated of in the memoirs which will follow the present one; for we must announce that the extraordinary phenomena of the new metal multiply in such a manner that they will require very considerable details. We do not yet pronounce either upon the possibility of conceiving this metal as an alloy, or upon its analogy with the palladium, or upon the name which ought to be given to this metallic substance which differs so materially from all others of the same class.

Comparative

Comparative Analysis of different Kinds of Alum.

By M. VAUQUELIN.

(Concluded from Page 392.)

Experiment V.

IT was also necessary to examine whether some of these species of alum contained sulphate of ammoniac; for this purpose I boiled them, in the quantity of thirty grammes and a half, in a retort provided with a recipient, with caustic potash in sufficient quantity to decompose the alum, and at the same time to dissolve the alumine. I obtained from English alum a quantity of ammoniac, which, saturated by the sulphuric acid, gave 4 decigrammes of sulphate of ammoniac; that of Ribaucour produced 3,5 decigrammes; that of Liege 2,5 decigrammes; finally, that of Aveyron 3 decigrammes: the two Roman species gave me only inappreciable quantities. These quantities of sulphate of ammoniac, which amount, as we see, only to a hundred and a half of the mass of the alums employed, cannot have any great influence upon the effects of these salts in dyeing, and in the other arts in which they are employed.

Experiment VI.

One of the objects which principally demanded my attention in this enquiry, was to know whether these alums contained iron, and in what quantity this metal might exist in each of the species; for it is not to be doubted that it is principally in the presence or absence of this matter that the differences between the alums for dyeing and the other uses consist. For this purpose I dissolved in potash the alumines precipitated by ammoniac, as in the first experiment, from 30,5 grammes of each of the alums. I obtained from the alum of the Aveyron 7½ centigrammes of oxyde of iron, from the alum of Liege 3

centigrammes, from the English $7\frac{1}{2}$ centigrammes, and from that of Ribaucour 8 centigrammes; those of Rome gave me only inappreciable quantities. Thus, in this respect, the latter species of alum is preferable to the rest.

However, although these alums contain the one only about a thousandth, and the others half a thousandth of oxyde of iron; if this metal fixes itself upon the stuffs which are to be dyed, in the same proportion as the alumine, these two substances are then mixed in the proportion of from one to one and a half *per cent.* which may produce effects injurious to certain colours.

I also subjected to chemical analysis the rose-coloured earth contained in the Roman alum, and which remains after the solution of this salt in water. It gave me to a hundred parts 31 of silex, 61 of alumine, and 8 parts of colouring matter composed of oxyde of iron and oxyde of nickel.

It appears that this earth contains also some traces of potash and of sulphuric acid, as its solution by the muriatic acid furnishes small quantities of alum by evaporation; which proves that this matter is an undecomposed remainder of the ore of La Tolfa, which is formed of the same elements as this earth.

According to the products obtained in the different operations above described, we may conclude, with sufficient certainty, that the alums contain to 100 parts,

Alumine - - - - - - - -	10,50
Sulphuric acid - - - - - -	30,52
Potash - - - - - - - - -	10,40
Water - - - - - - - - -	48,58
	100,00

The quantity of sulphuric acid is calculated according to the hypothesis, that the sulphate of barytes contains 32 per

per cent of this acid *. We have adopted this proportion because it quadrates better with the quantity of water which we have always found in the alums from 47 to 48 hundredths by a well-managed calcination. The quantity of potash is taken from the analysis of the sulphate of potash by Bergman, in which this chemist admits 52 *per cent.* of alkali.

Hence it follows, that to 30,52 of acid existing in a quintal of alum, 9,60 are united to the potash, and 20,92 to the alumine with which it forms an acidulous salt.

It results in general from the experiments which I have recorded in this memoir, that the quantities of alumine, of sulphuric acid, and of potash, are very nearly the same in all the species of alum which I have examined, that the only differences consist in some atoms of sulphate of ammoniac and of iron contained in those of Liege, of the Aveyron, of England, and of Ribaucour. Can this quantity of iron, which amounts only to about $\frac{2}{1000}$ in the alum of the Aveyron, which is the most charged with it, produce such a great difference in the properties of these salts as to reduce their value to only half that of the Roman alum?

If we suppose the alums of which I am here speaking, to be deprived of from one to two thousandths of oxyde of iron which they contain, for the slight traces of sulphate of ammoniac which exist in some species I reckon for nothing, it seems that they would be perfectly similar to the Roman alum, and in this respect those of Liege and of Ribaucour would approximate the nearest to it.

* It may be proper here to observe, that there seems to be some error in the table of the quantities of sulphuric acid contained in the alums, (in the first part of this paper, page 389, of our preceding number, which is exactly copied from the original,) as they are wholly inconsistent with the hypothesis and the quantities of sulphate of barytes specified as having been obtained from the decomposition of the alums, page 387. Edit.

But

But if there is really so great a difference between the effects of the Roman alum and those of the other species as the dyers pretend, it must be confessed, that the means which chemistry at present possesses are not sufficient to shew us the cause; but I believe, or I am greatly mistaken, that the great superiority attributed to the Roman alum is founded merely upon ancient prejudices, which originated when our manufactures were in their infancy, and have been perpetuated notwithstanding the improvement which their operations have since received; but it is more than probable that the manufactured alums exempt from iron must be as good for every purpose as those of Rome.

Moreover, in order to ascertain whether it is the presence of these almost imperceptible traces of iron and of sulphate of ammoniac which renders the manufactured alums inferior to those of Rome, it would be necessary to make comparative experiments in dyeing with them and with those of Rome; and if there should still be a real difference in the results, it would then be proved, that there are in the one some principles which do not exist in the others, or *vice versâ.*

We should have still greater reason to be astonished at the preference which has been given, and to the present day is still given, to the English alum over those of France and other countries, did we not know how that nation has contrived to produce prejudices of every kind in favour of its merchandizes; for it evidently results from our experiments, that this kind of alum is inferior to all those which we have examined.

It is therefore much to be desired, that the dyers, more attentive to their own interest, and divesting themselves of their prejudices injurious to French industry, might make comparative experiments with the alums of our manufactories and those of foreign production. I think

think I may promise them before hand, that the results which they will obtain will be in favour of the alums of France, with respect to their price compared with their qualities. Nor can it be too strongly recommended to the manufacturers, to redouble their exertions for bringing to still greater perfection their art, which has already made such great progress for about twelve years past. I have no doubt that, by following this advice, they will soon convince the consumers, that it is their interest, as it is that of all France, to employ in their operations no other alum than that of our own country.

I have reason to think, according to experiments of which I shall give an account hereafter, that we shall easily be able to separate the last portions of iron from the alum, by disturbing the first crystallization, as is practised at present for saltpetre, by afterwards washing the fine salt with cold water, and by employing in the refining operation a small quantity of prussiate of potash. The manufacturers might prepare this substance in the same two furnaces which serve to evaporate the aluminous waters, and as only a small quantity of it would be required, this would not sensibly augment the price of the alum.

Experiments and Observations on alcoholic Tinctures and medicated Wines. By M. Parmentier.

From the Annales de Chimie.

THE reflections which I have already communicated to the public on medicated wines, through the medium of the Annales de Chimie, render it unnecessary for me to adduce new proofs, in this place, of the defective nature of the process hitherto adopted for this kind of pharmaceutical preparation; but I announced at that time that

that I should spedily indicate the means of remedying it. It is now time that I should perform what I have promised; for experience and reason unite in favour of the method which I propose, and it is now the universal wish of all persons engaged in the practice of pharmacy, both civil and military, to have the medicated wines hitherto in use superseded by the instantaneous mixture of alcoholic tinctures with pure wine; a substitution which promises to be of the greatest advantage to medical practice.

Alcohol it is known dissolves, with the aid of infusion or of simple maceration, several substances; it takes up others in distillation; hence the liquors which were formerly called *tinctures*, *elixirs*, *drops*, *spirit*, *essence*, *quintescence*, *balsams*, &c. ill-adapted denominations, ought now to be banished from our pharmacopoeias; for it would certainly be more rational to designate all these alcoholic tinctures by the name of the substance which forms their base, or of the virtues which they have been known to possess from time immemorial.

Accordingly, with the view to classify more methodically the alcoholic tinctures, we thought it necessary to give to them the name of the vegetable substance which predominates in them, and afterwards to characterise the wine destined to receive one of these tinctures by the medicinal property which the mixture acquires by means of this association; it would then be easy to extend at will the nomenclature, according to the exigence of the cases, and the intention of the officer of health who prescribes.

Preparation of the alcoholic Tinctures.

The alcohol best adapted for the preparation of the tinctures destined to form, by their mixture with wine, those medicines which, in all pharmacopœias are termed *medicated wines*, ought to indicate 20 degrees by Baumé's areometer.

areometer. The solvent having always one and the same determinate degree of strength, exerts constantly the same action upon the vegetable substances to which it is applied; it takes up at the same time both the extractive-resinous and the resinous-extractive matter. Hence results a compound which, mixed in certain proportions with wine, changes neither its transparence nor its specific characters.

Another rule useful to be adopted in the general preparation of alcoholic tinctures is to perform the process at twice, and to commence the digestion of the ingredients with only half the quantity of alcohol prescribed, in order that it may charge itself first with the extract, and afterwards dispose the marc to furnish more easily what it still contains. By using this precaution, the alcohol becomes as much saturated as it can be with the two extracts most essential to the medicinal effect intended to be produced.

Tincture of Gentian.

Take Gentian root	- - -	64 grammes (2 ounces).
Orange-peel	- - -	32 grammes (2 ounces).
Alcohol at 20 degrees		$1\frac{1}{2}$ kilogramme (3 lbs.)

The gentian and orange-peel being reduced to a coarse powder, are put into a mattrass with half of the quantity of alcohol indicated. The vessel remains for six days exposed to the heat of the sun or of a sand-bath, according to the season of the year, and is frequently agitated; the liquid is poured off, and the digestion again performed for the same space of time, by pouring upon the marc the other portion of alcohol. The matter is strongly pressed out; the two liquors are united, filtrated, and put into bottles of a proper capacity, which are corked and kept in a cool place for use.

 Tinc-

Tincture of Cannella.

Take China cinnamon - - - 96 gr. (3 oz.)
Angelica root of Niort - 16 gr. (½ oz.)
Alcohol at 20 degrees - 1½ kil. (3 lbs.)
Proceed as above.

Tincture of Wormwood.

Take dried worm-wood tops, cut small, 128 gr. (oz.)
Alcohol at 20 degrees - - - - 1½ kil. (3 lbs.)
Proceed as above.

Tincture of Elecampane.

Take dried Elecampane root - - 256 gr. (5 oz.)
Calamus aromaticus - - - 16 gr. (½ oz.)
Alcohol at 20 degrees - - 1½ kil. (3 lbs.)
Proceed as above.

Compound Tincture of Horseraddish.

Take fresh horseraddish-root, sliced, - 384 gr. (2 oz.)
Orange-peel - - - - - - - 32 gr. (1 oz.)
Alcoholic tincture of scurvy-grass, 2 kil. (4 lbs.)
Proceed as above.

When fresh horseraddish-root is not to be had, we use dried, but in the proportion of a third more; for the most careful desiccation always causes it to lose some of its strength; though the contrary is the case with most roots, which generally in drying lose only their water of vegetation.

Tincture of Peruvian Bark.

Take pounded Peruvian bark - - 256 gr. (8 oz.)
Orange-peel - - - - - - 32 gr. (1 oz.)
Alcohol at 20 degrees - - - 1½ kil. (3 lbs.)
Proceed as above.

Tincture

Tincture of Squills.

Take dried squills, cut small, - -	156 gr.	(8 oz.)
China cinamon - - - - - -	32 gr.	(1 oz.)
Alcohol at 20 degrees - - -	$1\frac{1}{2}$ kil.	(3 lbs.)

Proceed as above.

Preparation of medicated Wines.

The custom of administering alcoholic tinctures by mixing them with wine at the moment they are to be taken, is by no means an innovation in medicine. *Quercetan*, *Bauderon*, *Charas*, though advocates for medicated wines prepared after the ancient method, recommend this practice. In fact, it must be remarked, that it is always in a very concentrated state that these celebrated pharmacologists prescribe the employment of alcohol, and that even, for fear of diminishing its power, they are very careful in requiring that the vegetables to which it is applied should be previously dried; the alcohol then, possessing its full strength, attacks only the oily and resinous part, and leaves behind the extractive matter, which the same menstruum, but at a lower degree of spirituosity, equally takes up; alcohol, therefore, at 20 degrees, or more commonly good brandy of commerce, this common solvent both of gums and resins, has appeared to us to deserve the preference, and to answer our purpose. Not but that in many circumstances these separations of the gum and the resin are of greater utility, since they multiply the resources of medicine; and it cannot be doubted that these immediate materials of vegetables, considered separately, possess properties diametrically opposite, of which the art avails itself; as is the case with opium, with hellebore, with ipecacuanha; but this question is foreign from the subject.

 We

We shall observe, before indicating the proportions of tincture which have been confirmed by repeated experiments in civil and military hospitals, that every kind of tincture might be employed in the proportion of between sixteen and eight parts to one of wine; that by this means the restorative and tonic properties of the latter would be augmented, not only on account of the extractive principle which it contains, but also by the small portion of free alcohol, which of a weak wine immediately makes a generous wine, more homogeneous than if the alcohol were afterwards added as condiment. It must here be remarked, that the alcohol employed for extracting the whole of the soluble vegetable matters ought to be considered as in a real state of combination, and that it then acts as a compound fluid in which the alcohol is incorporated nearly as it is in wine, of which it forms one of the essential principles. It cannot be doubted that if the alcohol existed in them in a free state it could not fail, acting by itself, to become too exciting, (to use the language of the new medical doctrine,) and to approach to the nature of the elixirs of *Garrus*, of *Stoughton*, of *Longevity*, the habitual use of which is an abuse, since they are really *diffusible stimuli*, on account of the superabundance of alcohol and the ingredients of which they are composed. Though experience has already decided upon the good effects of the wines thus prepared and administered as according to the old method, it would be possible progressively to increase the quantity of tincture, according to the exigencies of the case, and thus to double the active properties of the medicated wine, without equally augmenting the quantity of the liquid; and in this manner we should be able to keep up, during a certain time, the energy of a remedy which, like all others, insensibly becomes weaker by the continued use which is made of it.

Bitter

Bitter Wine.

Tincture of gentian - - - 24 gr. (6 drachms.)
Red wine - - - - - - - 1 kil. (2 lbs.)

Common dose 32 grammes (1 oz.)

Anthelmintic Wine.

Wine, either red or white, - 1 kil. (2 lbs.)
Tincture of elecampane from 32 gr. (1 oz.) to 64 (2 oz.)

Mix them. — Common dose 48 gr. (1½ oz.)

Febrifuge Wine.

Take red wine - - - - 1 kil. (2 lbs.)
Tincture of Peruvian bark from 48 gr. (1½ oz.) to 80 gr. (2½ oz.)

Common dose 60 gr. (2 oz.)

Antiscorbutic Wine.

Take white wine - - - 1 kil. (2 lbs.)
Tincture of horseraddish from 32 gr. (1 oz.) to 48 gr. (1½ oz.)

Common dose 32 gr. (1 oz.)

Cordial Wine.

Take red wine - - - 1 kil. (2 lbs.)
Alcoholic tincture of cinnamon from 24 gr. (6 drachms) to 48 gr. (1½ oz.)

We might, by means of the method proposed, immediately obtain super-compounded medicinal wines, by adding to the wines, for example, tincture of elecampane and of squills in proportions regulated according to the constitution and age of the subject, and the state of his malady, whereby wines more active in their effects would be produced.

The

The alcoholic tinctures being once kept ready prepared, it would be easy, by mixing them in the proportions which we have indicated, immediately to render medicinal, not only red or white wine, but also malt-liquor, cyder, &c. according to the resources of the situation, or the habits and views of the physician, who prescribes without changing the specific character of the respective vehicles.

A quality which is particularly desirable in a class of medicines which are in such general use that they have become as it were domestic remedies, is that when the alcoholic tincture is mixed in certain proportions with the wine, this mixture may preserve that transparency, that perfume, that *roughness*, which seem in some measure to banish that repugnance which convalescents generally feel at the time when their organs recover the exercise of their functions, and when they begin to taste the aliments and drinks which are presented to them; and this is the peculiar characteristic of the medicinal wines composed as I propose.

It would be in vain to object, that to palliate the natural disagreeable taste of the remedies is to weaken their efficacy, and that frequently the extreme repugnance which they occasion is the determining cause of a salutary crisis. This consideration is in no wise applicable to the medicated wines, since they are generally prescribed only when the object is to restore the vital powers which have been debilitated either by the diseases or by the agents, whether useful or useless, which have been employed to combat them. Moreover, it will always be rendering a service to the practice of medicine, to enable the physician to present to his patient remedies in an agreeable form, and even the artifice of introducing them under the name and appearance of a delicious aliment

ment is a circumstance of no slight utility. Are not the sick already sufficiently to be commiserated without adding to their sufferings the disgust naturally produced by medicines? They may at least be spared that aversion which the stomach always feels against whatever bears the name of a drug; and how many persons delay the taking of a purge, notwithstanding the necessity of such precaution, on account of their disgust against the common medicines.

But to the apothecary who feels it his duty to promote the salutary influence of the medicine prescribed by the application of the utmost accuracy and insight on his part, the good quality of the wine which he prepares is a matter of the utmost consequence. Every such person must have had the opportunity of making the same observations which I have recorded in this treatise, and must at the same time have lamented to hear the complaints which are so incessantly repeated against the quality of medicinal wines, and which frequently compel the patients to relinquish their use before having been freed from the affections for which these remedies were so well indicated.

Several distinguished members of the former college of Pharmacy at Paris, among others M. Chomet, has written to me to congratulate me upon my having attacked the ancient method, adding that, tired of distributing a medicine always of a bad quality, and finding his efforts and the art incompetent to prepare them better, he had for three years past had recourse to the process of the tinctures, and that many physicians and surgeons daily testified their satisfaction with respect to the good quality of the medicinal wines which they constantly found at his shop.

Nothing

Nothing that concerns medicines ought to be indifferent to the physician who prescribes, to the apothecary who prepares, and especially to the patient who requires to be cured. The means which tend to render a resource in medicine less disagreeable, and more easy of administration, and less variable in its efficacy, ought to be embraced with ardour by all who have the preservation of the lives of their fellow-creatures at heart.

An additional advantage of the method which I propose will be, that the patient for whom the medicinal wine is prescribed, in order to complete his recovery, will be able to prepare it at home with the wine of his own cellar. If a change of air, or retirement into the country is required, he need only procure from the apothecary one or more bottles of the proper alcoholic tincture, and we all know how much confidence people generally place in what they do themselves, especially when it concerns aliments or drinks.

Undoubtedly it was a great improvement in medicines to introduce the use of wine diluted with water as a drink; but it would be of not less utility to the sick to employ it equally as a vehicle for all the medicines which are prescribed as tonics and restoratives, particularly for those which consist of strong alcoholic tinctures, which are generally administered by drops with water, the transparency of which they destroy by decomposing themselves; whereas wine, whilst it diminished the disagreeableness of the remedy, would augment its energy, and be preferable to many of those electuaries diluted with water, which afford only a very compound, thick liquor, of a disagreeable odour, which is always taken with reluctance, and consequently without benefit. Nevertheless they are the advocates for these formulæ, who have

have endeavoured to censure our new method of preparing the medicated wines. Let us attend a little to their objections.

Reply to the Objections made against the Medicinal Wines.

It has been pretended, that if the wine employed for this purpose were generous, and always well selected, the product which resulted from it would be exempt from the inconveniences which I attribute to the antient method of preparing medicinal wines.

I shall remark, that the red wines which have passed through the different periods of spirituous fermentation are all composed of the same principles, but in different proportions; that one need only have frequented the pharmaceutical laboratories and the hospitals to be perfectly convinced that it is of little importance whether the wine comes from Brie or from Roussillon, whether it be new or old, generous or weak, red or white, provided that it has in its kind the qualities required; all will be more or less sensibly deteriorated according to their quality by the mere circumstance of maceration with a vegetable substance; that they do not require, as is believed, a space of several days to accomplish their decomposition, since they carry with them an immediate cause of alteration, which it is not in human power to stop or prevent.

But it must be confessed, that these inconveniences are not quite so strongly marked with regard to the liquor-wines, their composition not being the same, they must necessarily present also different results in their mode of action and of combination; it is for this reason, sanctioned by experience and observation, that Spanish wine or Frontignac ought to be kept as solvent of some active and much-used medicinal wines, always adding to them,

 after

after they are made, a little concentrated alcohol, in order to retard their acetification.

Another objection, the solution of which appears to belong to the great question respecting the nature and the seat of the medicamentous principle, is that the alcoholic tinctures, employed in the proportion of one part to eight of wine, do not contain as much extractive matter as the wine which should have served as a solvent instead of a vehicle; that *ceteris paribus* we ought to prefer the tincture of which water should always be the excipient, because, mixed afterwards with the wine, there would result from it a better dosed medicine, more abundant in principles, and more energetic in its effects.

Even were it well demonstrated that the alcoholic tinctures are less charged with extractive matter than the vinous and aqueous tinctures, it is sufficient that by their impression upon the organs and the animal economy they announce the existence of the aroma and of the taste of the roots, the barks, the leaves, and the fruits, in order to produce their effect. Moreover, has sufficient attention been paid to the difference between the action of a medicine dissolved in alcohol, which is converted into gaseous fluid by the vital motion and heat, and distributed speedily and universally throughout the general system, and the action of the same medicine employed in the same proportions, but held in solution in water mixed afterwards with wine, or in the wine itself?

In order to form a notion of the great increase of intensity and action which the medicamentous principle may acquire when combined with dilute alcohol, let us recollect the observation of Stahl, who examined the effects of several remedies, as a physician, and investigated, as a chemist, the causes of these effects. This

great

great man informs us, that four grains of jalap-resin purge infinitely better when combined with dilute alcohol, than twelve grains administered in another form. We may now apply to these observations the effect of our alcoholic tinctures, and it will easily be conceived that a table-spoonful might very well be equivalent to the quantity of matter extracted immediately by eight times its weight of wine.

Let us also recollect, that the active part of the most efficacious remedies seems to depend upon an extremely small portion, and that it is perhaps with medicines as with aliments, namely, that in the quantity which we take of them, the operating principle often does not form a twentieth part of the whole; so that it is very dubious whether it be by their mass or by their extreme divisibility that the remedies act, whence it is natural to conclude that the action and the virtue of medicines is still a problem; but what may not be expected from the present state of chemical knowledge, which opens to physicians a new path, whereby they may arrive at the solution of this problem?

It would be superfluous here to make the enumeration of all the diversitics presented by the extractive matter of one and the same vegetable treated hot or cold with water, with wine, with dilute, or with concentrated alcohol, or to give even an idea of the different combinations, and of the varieties of action of one and the same medicine prepared by the same agent, but at different temperatures; this discussion would carry us beyond the bounds which we have prescribed to ourselves; we shall therefore confine ourselves to a similar question respecting the aqueous or vinous tinctures which are prescribed in place of the alcoholic tinctures, without however supporting the assertion of any datum capable of

Nnn 2 justifying

justifying the adoption or rejection of one or the other method.

We only ask those, who give the aqueous tincture the preference over the alcoholic tincture, to inform us what they can hope from the water in maceration with a vegetable, when, saturated as much as it can be with the extractive principle which it contained, the product of this maceration is afterwards diluted with wine in equal parts, and administered in quality of a cordial, stimulant or tonic. It is then useless to require, as an express condition in the formula, that the wine be generous and limpid, since these two qualities are destroyed at the moment when the mixture is made; and how should this wine, diluted with a bitter infusion or a decoction of Peruvian bark, become comparable to the medicinal wine, properly so called, since, instead of an extracto-resinous matter, in which its virtue consists, there is added to its constituent parts only a purely extractive matter, and this mixture is also turbid, and as disagreeable to swallow as if it had been prepared by the defective process. Now the patient, to whom it was intended to administer both a stomachic and a wine, has had neither the one nor the other.

Those who believe that the vegetables act by their whole substance might, instead of putting them to infuse in the alcohol, dry them and reduce them to powder, and then mix them with wine at the moment when they are to be used. It is not yet forgotten, that the remedy which has produced the greatest effects in intermittent fever, proposed by Talbot, and which had at first such great celebrity, was nothing else than Peruvian bark pulverized and mixed with wine: this remedy, which is already anticipated, has been recommended anew in pharmacopœias, without indicating its origin.

It

It is especially in the civil hospitals that wine ought to accompany a great part of the medicines which are there administered. Upon a close examination of the morbid state of most of the indigent persons, it is soon perceived that many of these maladies arise from the violent exercise which they undergo, the want of cleanliness and pure air in their habitations, the bad quality, or the deficient quantity of their nourishment; and what is frequently prescribed for them contrary to the instinct of nature, which demands cordials in order to augment the motion of the fluids, to excite the play of the organs, and to restore tone to the fibres. Whey sweetened with sugar, mucilaginous drinks with honey, juices of herbs, lozenges, emollient drinks, all relaxing substances which, far from exalting the vital action, only increase the atony of the solids; and these unhappy persons, unable to resist an exacerbation, to support a crisis, succumb and die of debility.

But we have sufficiently insisted upon the necessity of substituting in place of the process described in the best pharmacopœias, for preparing the medicinal wines, another founded upon chemical and pharmaceutical laws; far therefore from banishing this kind of remedy from medical use, we re-establish it in that state of perfection in which it ought to be in order to produce its full effects, and if probabilities may be allowed to authorize a decision, we do not doubt that the medicinal wines will hereafter obtain a reputation which they never possessed at the period of their first celebrity.

But as experiments only must confirm what theory indicates, and as these experiments cannot be undertaken with the hope of any success unless by the officers of health, who have frequent occasion to prescribe the use of medicinal wines, we cannot sufficiently urge them to occupy

occupy themselves particularly with this object, to try without prejudice in their practice the results which they will obtain from both methods employed comparatively, in order that not the slightest doubt may be left respecting the advantages of the preparation of medicinal wines with the aid of alcoholic tinctures.

Intelligence relating to Arts, Manufactures, &c.

(Authentic Communications for this Department of our Work will be thankfully received.)

New Property of Magnesia.

M. GIOBERT has discovered that magnesia communicates the property of resisting fire to all earths with which it is mixed. If one-third or one half of magnesia be added to the clay of which crucibles are made, when it is not very ferruginous, they will resist the action of the fire in the best manner possible.

Secret Writing.

We are informed that a scientific gentleman has invented a device, which is said to be of such unlimited application in its principle, that as many alphabetical keys or diagrams can be constructed as would provide, if requisite, a different one for every inhabitant of the globe; each of which teaches various dissimilar modes of swift and secret writing, upon any subject and in any language whatever; and which is so easy, as well as perfect in practice, that the meerest clown might defy all the philologists of Europe to decypher the shortest sentence. It is said in this method to be a matter of indifference whether the writer employs two characters or two hundred, the same plan being susceptible of such a variety of modifications.

Lamp

Lamp for Chemical Purposes.

Mr. Frederic Accum has invented a chemical lamp, with double concentric wicks. The advantages of this lamp above all others consists in quickly producing, if required, a very low as well as a very intense heat, and in regulating its power instantaneously.

List of Patents for Inventions, &c.

(Continued from Page 320.)

BARKER CHIFNEY, of London, Gentleman; for a composition to be used in washing, in order to render muslins and linens beautifully white, and for other purposes. Dated September 14, 1804.

JOHN BYWATER, of the town and county of the town of Nottingham; for an improved method of clothing and unclothing the sails of wind-mills while in motion, provided they are made after the Dutch manner, or as the generallity of windmill-sails are constructed; by which the mill may be clothed either in whole or in part in an easy and expeditious manner, by a few revolutions of the sails, whether they are going fast or slow, leaving the surface smooth, even, and regular in breadth, from top to bottom. And in like manner the cloth, or any part thereof, may be rolled or folded up to the whip at pleasure, by machinery simple and durable, that may be fixed up in a few days, at a comparatively easy expense, requiring very little alteration of any part of the mill, and is equally applicable to any old sails on the common construction, however warped or bosomed, without the necessity of having new cloths. Dated September 14, 1804.

JOHN GREGORY HANCOCK, of Birmingham, in the county of Warwick, Die-engraver; for a method of forcing

forcing or working the bolts of presses or of engines used for the purpose of cutting, pressing, and squeezing of metals, horn, tortoise-shell, leather, paper, and other substances. Dated September 14, 1804.

JOSEPH HUDDART, of Highbury-Terrace, in the parish of Islington, in the county of Middlesex, Esquire; for a mode or art of manufacturing and spinning yarn different from any such now in use.
Dated September 21, 1804.

MICHAEL SCARTH, of Castle Eden, in the county of Durham, Sail-cloth-manufacturer; for a method of manufacturing sail-cloth with single or double thread warp without starch, or any substitute for stiffening, and without the double threads being twisted together.
Dated September 21, 1804.

ERRATA.

Page 82, line 20, place the comma after the word cylinder — l. 30, place the period after the word circle — P. 83, l. 4, *for* C D *read* E D— last line, *for* cylinders *read* cylinder is — P. 84, l. 2, place a period after the word omitted — l. 5, *for* piston *read* piſtons — l. 9, *for* Fig. 5 *read* Fig. 4—P. 85, l. 1, *for* capable of its *read* capable of commencing its— P. 86, l. 4, *for* franges *read* flanges—l. 15, dele the period after C, and place one after the word connected—last line, *for* a parrellopiped, at H, in a, *read* a parallellopiped. At H is a—P. 87, l. 22, for A N G D *read* A N G B — P. 24, *for* purpose of making *read* purpose as making — P. 88, l. 16, *for* inner lid *read* inertia — P. 228, l. 11 and 12, *for* superabundant *read* supernatant — P. 230, l. 3, *for* breaking *read* treating — P. 234, l. 1, *for* some *read* somewhat — P 235, l. 2, *for* DE ROOVAS *read* DE ROOVER — P. 236, l. 8, *for* so gros *read* ten drams—l. 27, *for* odorus *read* odors — P. 289, l. 18, *for* spontaneous *read* saponaceous — P. 388, l. 27, *for* not *read* next — P. 391, l. 17, *for* sulphate *read* sulphite—l. 24, ditto, ditto—P. 402, l. 21, dele the comma after fire-place, and insert a period after the word dome.

END OF THE FIFTH VOLUME, SECOND SERIES.

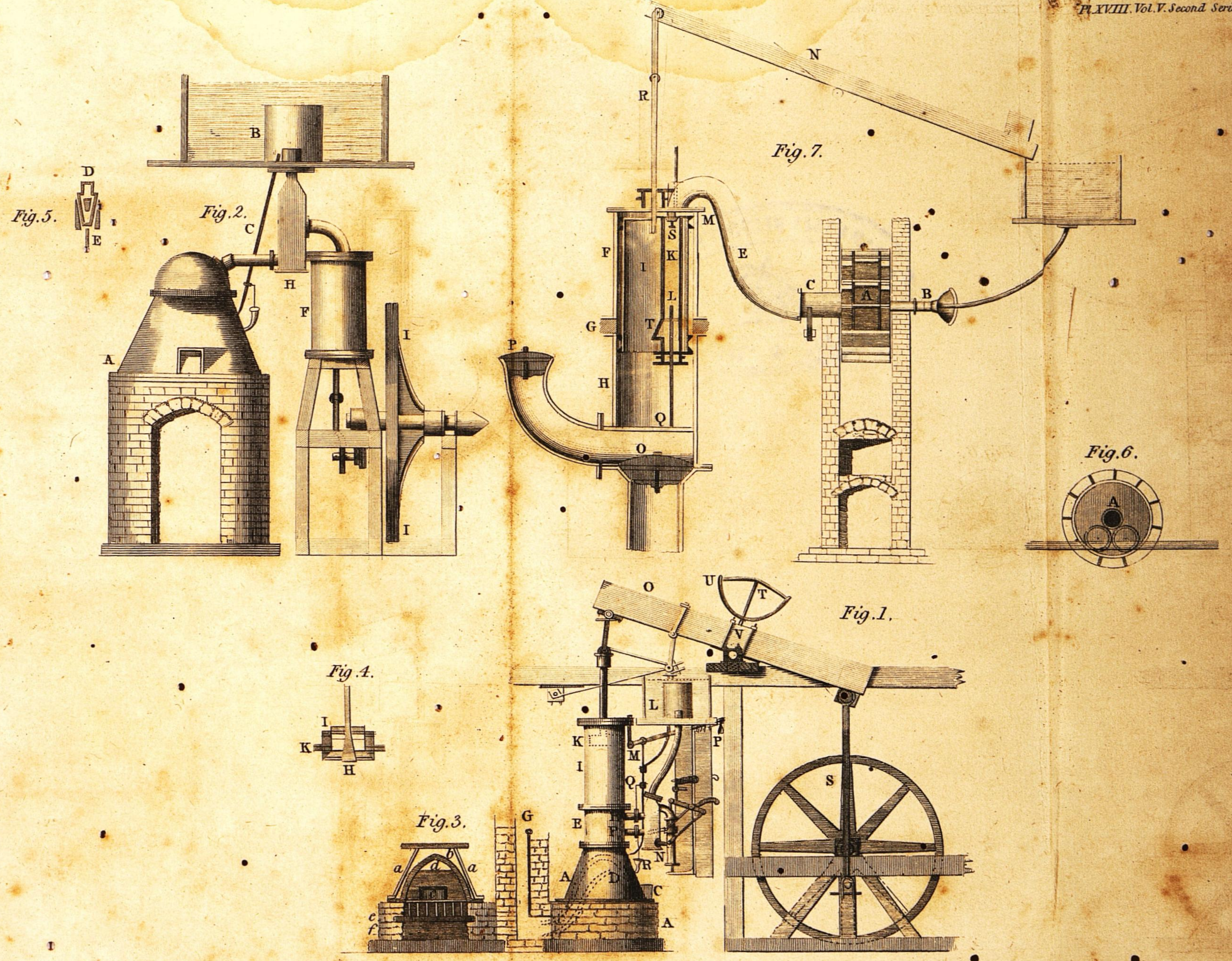
Fig. 5.
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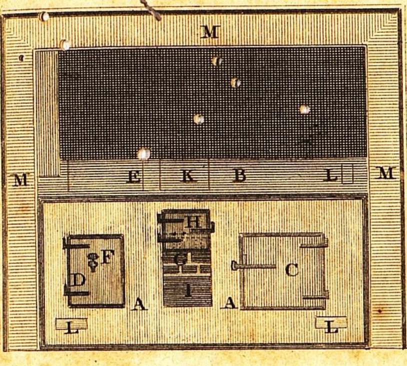
Fig. 1.



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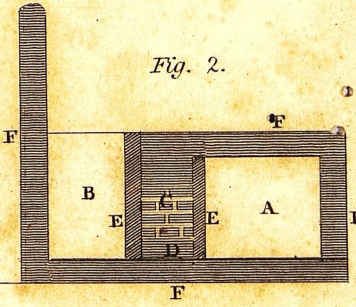

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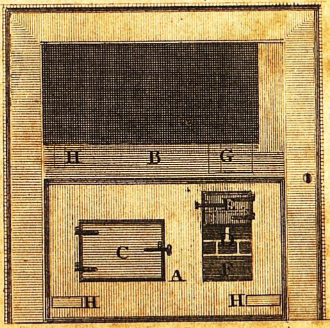

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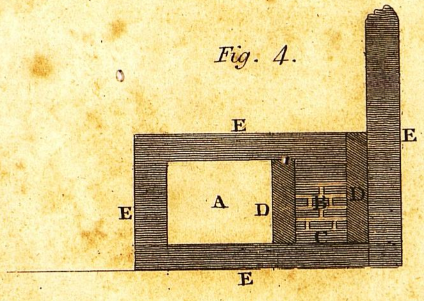

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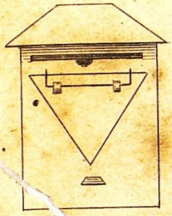
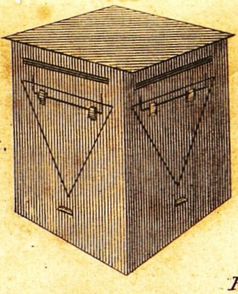


Fig. 2.



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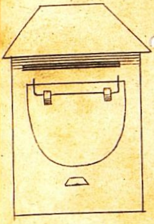

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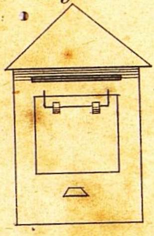

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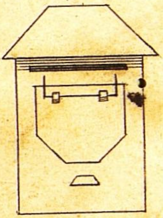

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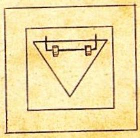

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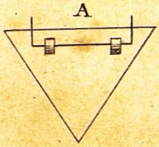
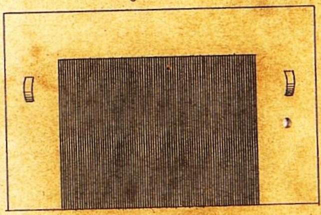


Fig. 7.



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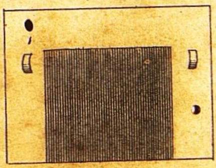

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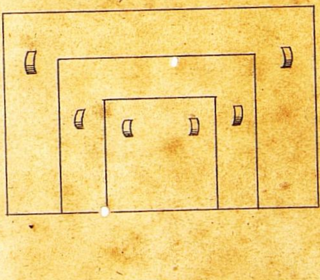

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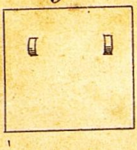

Fig. 10.

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